

ATMOSPHERIC ELECTRICITY.

AURORAS.

2d.—Tatoosh Island, Washington Territory: a brilliant aurora was observed from 3 to 5 a. m.; it consisted of a white light rising about 15° above the horizon.

5th.—Bismarck, Dakota: a faint aurora appeared at 11.30 p. m. covering 120° of the northern horizon and extending to an altitude of 30° with occasional slender beams shooting up to 45°; the display was obscured by clouds at 1 a. m. of the 6th.

5th.—Webster, Dakota.

12th.—Eastport, Maine: an auroral arch of about 10° altitude was observed from 8 to 11 p. m. At 10.20 p. m. a beam one degree in width extended from the northeastern horizon to an altitude of 45°.

12th.—Cambridge, Massachusetts: suspected at 10.15 p. m.

13th.—Yates Centre, Kansas: an aurora was observed at 11.25 p. m. consisting of three faint radiating beams extending to an altitude of 30°; at 11.40 p. m. a faint bar formed above the others at an altitude of 40°.

15th.—Vevay, Indiana: from 2 to 2.30 a. m., of moderate brilliancy.

16th.—Vevay, Indiana.

17th.—Manistique, Michigan: from 9 p. m. until midnight.

18th.—Vevay, Indiana: from 11 p. m. until 2 a. m. of the 19th.

21st.—Vevay, Indiana: bright crimson aurora at 2.30 a. m.

22d.—Eastport, Maine: well-defined auroral arch from 9 to 10 p. m.; extending from northeast to northwest and to an altitude of 20°.

24th.—Indianapolis, Indiana: at 12.15 a. m. an auroral light was observed along the northern horizon from east to west, reaching an altitude of 40°; at 12.40 the light was but faintly visible.

27th.—Des Moines (near), Iowa: very bright aurora in the morning.

30th.—Harvard, Nebraska.

31st.—Webster, Dakota: during the evening streamers were observed reaching nearly half way to the zenith.

THUNDER-STORMS.

Thunder-storms are reported to have occurred in the various states and territories on the following dates:

Alabama.—4th, 5th, 7th, 8th, 10th to 13th, 16th, 17th, 19th, 21st, 24th to 28th, 30th, 31st.

Arizona.—8th, 9th, 12th to 23d, 27th to 31st.

Arkansas.—2d to 5th, 9th to 14th, 16th, 17th, 20th to 23d, 25th to 29th, 31st.

California.—3d, 7th, 26th, 27th.

Colorado.—1st to 4th, 7th to 10th, 12th, 13th, 15th to 23d, 25th to 31st.

Connecticut.—3d, 4th, 5th, 7th, 8th, 9th, 21st, 25th, 29th, 31st.

Dakota.—2d to 5th, 7th, 8th, 11th to 31st.

Delaware.—24th, 26th.

District of Columbia.—9th, 10th, 18th, 19th, 21st, 25th, 26th, 31st.

Florida.—Daily.

Georgia.—4th to 15th, 18th to 21st, 23d to 31st.

Idaho.—1st, 2d, 7th, 8th, 9th, 24th, 25th, 30th.

Illinois.—5th to 10th, 12th to 19th, 21st to 31st.

Indiana.—3d, 4th, 5th, 7th to 10th, 13th, 15th, 18th, 19th, 21st to 26th, 28th to 31st.

Indian Territory.—5th, 9th, 10th, 13th, 14th, 20th, 22d, 28th.

Iowa.—1st, 3d to 9th, 12th to 31st.

Kansas.—1st to 7th, 9th to 17th, 21st to 31st.

Kentucky.—9th, 18th, 22d, 23d, 26th, 30th.

Louisiana.—2d, 4th to 8th, 10th to 14th, 16th, 18th to 31st.

Maine.—5th, 6th, 9th, 10th, 21st, 22d, 25th, 29th, 31st.

Maryland.—2d, 5th, 9th, 10th, 18th, 19th, 21st, 24th, 25th, 26th, 31st.

Massachusetts.—2d to 6th, 8th, 9th, 10th, 14th, 21st, 25th, 26th, 28th, 29th, 31st.

Michigan.—6th to 9th, 12th to 16th, 18th, 19th, 20th, 23d, 24th, 26th to 30th.

Minnesota.—3d to 8th, 11th, 12th, 13th, 15th, 16th, 18th, 19th, 20th, 22d, 24th, 26th to 30th.

Mississippi.—1st to 5th, 7th, 10th, 12th, 14th, 16th, 17th, 19th, 21st, 22d, 26th to 31st.

Missouri.—2d, 4th, 5th, 9th, 13th, 17th, 21st, 22d, 25th, 26th, 30th, 31st.

Montana.—1st, 2d, 3d, 5th, 7th to 10th, 14th to 17th, 19th, 24th to 27th, 30th, 31st.

Nebraska.—1st, 3d, 4th, 5th, 7th to 10th, 12th, 14th to 18th, 20th to 23d, 25th to 31st.

Nevada.—1st, 7th, 23d, 24th.

New Hampshire.—4th, 6th, 7th, 9th, 29th, 31st.

New Jersey.—2d, 4th to 10th, 14th, 18th, 20th, 21st, 24th to 27th, 29th, 31st.

New Mexico.—2d, 3d, 6th, 9th, 10th, 13th, 16th, 17th, 18th, 21st to 28th, 30th.

New York.—4th to 10th, 13th to 17th, 20th, 21st, 23d to 26th, 28th, 29th.

North Carolina.—4th, 5th, 6th, 9th to 14th, 17th, 18th, 19th, 21st to 30th.

Ohio.—1st, 6th, 8th, 9th, 11th, 13th, 15th, 16th, 18th to 26th, 28th to 31st.

Oregon.—2d, 3d, 26th to 30th.

Pennsylvania.—1st, 4th to 10th, 13th, 14th, 20th to 26th, 29th, 31st.

Rhode Island.—3d, 9th, 10th, 14th, 21st, 25th, 26th, 31st.

South Carolina.—4th to 8th, 11th to 17th, 19th, 20th, 21st, 23d to 31st.

Tennessee.—3d to 6th, 9th to 14th, 16th, 18th to 31st.

Texas.—1st to 8th, 10th, 11th, 12th, 14th to 31st.

Utah.—7th, 9th, 14th, 15th, 16th, 21st, 23d, 27th.

Vermont.—3d, 5th, 6th, 9th, 10th, 14th, 24th, 25th, 29th, 30th, 31st.

Virginia.—2d, 4th, 5th, 10th, 11th, 17th to 20th, 22d to 27th, 29th, 30th, 31st.

Washington Territory.—1st, 7th to 10th, 27th, 30th, 31st.

West Virginia.—14th, 22d, 23d, 24th, 26th.

Wisconsin.—1st, 3d, 5th to 9th, 12th, 13th, 14th, 16th, 18th to 25th, 27th to 31st.

Wyoming.—1st, 2d, 8th, 9th, 18th, 20th, 23d, 26th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arizona.—3d, 9th.

Arkansas.—3d, 4th, 10th, 13th, 31st.

California.—6th, 9th, 18th.

Dakota.—24th.

Florida.—28th, 31st.

Illinois.—2d, 12th, 14th, 27th.

Indiana.—2d, 7th, 9th, 12th, 16th, 17th, 27th, 28th.

Iowa.—7th, 8th, 13th, 15th, 17th, 20th, 28th, 31st.

Kansas.—11th, 31st.

Louisiana.—22d.

Maine.—5th, 17th.

Massachusetts.—13th.

Michigan.—8th, 12th, 19th.

Minnesota.—3d, 19th.

Nebraska.—12th, 17th, 19th, 27th, 28th, 29th.

New Jersey.—5th.

New York.—5th, 6th, 13th, 15th, 23d.

Ohio.—8th, 9th, 10th, 12th, 13th, 25th.

Oregon.—1st, 2d, 16th.

Tennessee.—1st, 2d, 24th, 26th, 27th.

Virginia.—2d, 10th, 11th.

Wisconsin.—18th.

Wyoming.—3d, 4th, 27th, 28th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories on the following dates:

Arkansas.—23d, 24th, 27th.

Colorado.—3d, 22d.

Dakota.—24th, 26th.

District of Columbia.—3d.

Florida.—19th, 21st, 24th to 28th.

Georgia.—19th, 27th, 29th.

Illinois.—23d, 26th, 27th, 29th, 31st.

Indiana.—15th, 16th, 17th, 20th, 26th to 29th.

Iowa.—21st, 22d, 24th, 26th, 27th, 29th.

Kansas.—12th, 15th, 21st, 25th, 26th.

Louisiana.—19th, 22d, 24th.

Maine.—20th.

Maryland.—22d, 23d, 24th, 30th.

Massachusetts.—17th.

Michigan.—19th, 22d, 24th.

Minnesota.—24th.

Montana.—22d, 25th.

Nebraska.—10th, 18th, 22d, 28th, 29th.

New York.—21st, 22d.

North Carolina.—22d, 26th.

Ohio.—16th, 19th, 20th, 21st, 23d.

Pennsylvania.—21st, 25th.

South Carolina.—23d.

Tennessee.—19th, 24th, 26th, 27th.

Texas.—1st, 21st to 24th, 26th.

Virginia.—6th, 7th, 15th, 16th, 17th, 19th to 25th, 29th, 30th.

Wisconsin.—20th; 24th.

The phases of the moon during July were: last quarter, 5th, 7.20 a. m.; new moon, 12th, 12.10 a. m.; first quarter, 18th, 7.14 p. m.; full moon, 26th, 9.17 p. m.; perigee, 11th, 8.24 p. m.; apogee, 25th, 4.18 a. m.

MIRAGE.

Mirage was observed at the following stations during the month:

Salina, Kansas, 5th, 7th, 10th, 13th.

Northfield, Minnesota, 19th, 28th, 29th.

Rock Academy, Caswell county, North Carolina, 22d, 27th.

Oswego, New York, 27th: the islands near Kingston and foot of lake, ordinarily not visible, were plainly seen.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for July, 1885:

Date— July, 1885.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
8, 9 a. m.	.....	.....	.....	.....	.....	.....	5	65†	
9, 11 a. m.	0	5†	0	5†	0	5†	5	65†	
10, 2 p. m.	1	5†	1	10†	0	0	5	60†	
11, 7 a. m.	2	5†	0	25†	1	3	7	40†	
12, 4 p. m.	2	30†	2	15†	2	20†	7	60†	
15, 5 p. m.	1	40†	.....	.....	1	20†	7	105†	
16, 4 p. m.	2	10†	0	0	0	0	9	110†	
19, 5 p. m.	1	1	.....	.....	.....	.....	8	110†	
20, 7 p. m.	1	1	.....	.....	.....	.....	7	85†	
22, 4 p. m.	0	10†	.....	.....	.....	.....	6	115†	
23, 5 p. m.	.....	.....	.....	.....	.....	.....	5	65†	
27, 11 a. m.	1	15†	.....	.....	1	15†	4	55†	
29, 5 p. m.	0	0	.....	.....	0	0	2	35†	
30, 4 p. m.	1	1	0	0	0	0	3	25†	
31, 4 p. m.	1	10†	0	0	0	0	4	35†	

Faculae were seen at the time of every observation.

† Approximated.

Prof. L. G. Carpenter, of the Michigan State Agricultural College, Lansing, reports sun spots during July as follows:

3d, 1.10 p. m., seven groups, seventy-three spots; 4th, 10.15 a. m., eight groups, thirty-three spots; 6th, 1.10 p. m., six groups, twenty-four spots; 7th, 1.30 p. m., five groups, forty spots; 11th, 12.30 p. m., four groups, twenty-spots; 16th, 4.15 p. m., three groups, seventy spots; 20th, 5.30 p. m., seven

groups, fifty-four spots; 23d, — p. m., five groups, forty-five spots; 25th, 5 p. m., two groups, eighteen spots (hazy); 27th, 3 p. m., four groups, forty-three spots; 31st, 4.30 p. m., four groups, twenty-nine spots.

Mr. H. D. Govey, at North Lewisburg, Champaign county, Ohio, reports sun spots on the following dates: 1st, 3d, 4th, 6th, 7th, 8th, 10th, 11th, 12th, 14th, 16th, 18th, 20th, 22d, 24th, 27th, 28th, 29th, 31st. The spots were numerous and large about the middle of the month.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-one stations show 4,912 observations to have been made, of which ten were reported doubtful; of the remainder, 4,902, there were 4,103, or 83.7 per cent., followed by the expected weather.

The observer at Cedar Keys, Florida, reports a beautiful and very brilliant red glow, extending to the zenith, at sunset on the 23d.

The following is taken from "The Morning Oregonian," of July 4th, published at Portland, Oregon:

The western sky was colored a bright roseate hue last evening, and all around the horizon and up to the zenith the clouds were fringed with red—a repetition of the "red sunsets" of last summer, which were the subject of so much discussion. This is the first time the phenomenon has been seen in any degree of magnitude this season. About 9 o'clock it was very brilliant and attracted general attention.

DROUGHT.

Arkansas.—Lead Hill, Boone county: although very heavy rains fell during the first half of the month, during the latter half, dry weather prevailed. At the close of the month corn and cotton were suffering for rain.

California.—Cape Mendocino: no rain fell here during July, although precipitation in the form of fog, to the amount of 0.32 inch, was collected in the Signal Service rain-gauge. Pastures have become parched and streams have dried up.

Indiana.—Vevay, Switzerland county: from the 13th to 22d vegetation suffered for rain; on the last-named date a heavy rainfall occurred.

Sunman, Ripley county: the month has been unusually warm and dry.

Kansas.—Elk Falls, Elk county: very dry weather prevailed from the 1st to 29th.

Maud, Kingman county: but little rain fell during the latter part of the month, and vegetation suffered in consequence.

Louisiana.—Grand Coteau, Saint Landry parish, 31st: the corn crop in this vicinity has been injured by drought.

Massachusetts.—Amherst, Hampshire county: at the close of the month a severe drought prevailed; but 0.20 inch of rain fell from the 14th to 31st.

Westborough, Worcester county: the month was hot and dry; the monthly rainfall, 1.56 inches, was the smallest for many years.

Dudley, Worcester county: the month was very dry; the total rainfall amounted to but 1.26 inches.

Mississippi.—Natchez, 12th: although numerous rains have fallen in this vicinity, on many plantations in this (Adams) county there has been no rain for several weeks.

New Jersey.—Vineland, Cumberland county: drought prevailed during the month, causing serious injury to crops.

New York.—Humphrey, Cattaraugus county: very dry weather prevailed at the close of the month; springs and wells were failing.

North Carolina.—Kitty Hawk, 22d: drought has caused injury to crops in this vicinity.

Portsmouth, 9th: vegetation in this vicinity is suffering seriously from drought.

Oregon.—East Portland: very hot and dry weather prevailed in this region throughout the month.

Ashland, 23d: very warm and dry weather prevails in this region; rain is much needed.